

What we claim is:

1. A decision feedback equalizer for suppressing intersymbol interference by feeding-back decided data to equalize waveform distortion of a received radio wave affected by fading in any radio wave transmission medium of the received radio wave,  
5 comprising:

impulse response estimating means for estimating an impulse response of the radio wave transmission medium;

10 first waveform equalizing means for waveform equalizing the received wave, on the base of an intersymbol interference component corresponding to more than two symbol-delayed wave and an estimated intersymbol interference component corresponding to one symbol-delayed wave, by the use of an impulse response of the radio wave transmission medium  
15 estimated by said impulse response estimating means, thereby producing an equalized signal including an intersymbol interference component of one-symbol delayed wave, said intersymbol interference component corresponding to an estimated one symbol-delayed wave being produced by the use of  
20 an intersymbol interference component corresponding to more than two symbol-delayed wave ;

second waveform equalizing means for waveform equalizing said equalized signal including an intersymbol interference component of one-symbol delayed wave, on the base of  
25 intersymbol interferences component corresponding to all the one symbol-delayed waves, by the use of the impulse response of the radio wave transmission medium estimated by said impulse response estimating means;

area decision means for predicting, by deciding an existence

area of a one symbol-preceding equalized signal, whether or not decision error appears because of noise interference, for carrying out area decision operation for each of respective equalized signals of instant symbol in a case where any appearance of decision error is predicted, and for generating three signals which are an equalized signal of the instant symbol presumed to be correct in its equalized signals, said decided data of the instant symbol obtained by demodulating the equalized signal, and decided data of the one preceding symbol employed for equalizing the just equalized signal, said decided data of the instant symbol being applied to said first waveform equalizing means to produce said estimated intersymbol interference component corresponding to one symbol-delayed wave; and

means for producing the intersymbol interference component corresponding to more than two symbol-delayed wave by the use of the intersymbol interference component corresponding to more than two symbol-delayed wave in order to feed back the intersymbol interference component corresponding to more than two symbol-delayed wave to said first waveform equalizing means.

2. A decision feedback equalizer according to claim 1, in which said existence area comprises decidable areas determined for detecting expansion of a signal point by noise and at least one uncertainty area determined for detecting certainty of presumed one symbol-preceding decided data, each of said decidable areas being an area where decided data is assumed to be correct since each of distance of the decided data from a corresponding proper signal point is smaller than a threshold value  $TH_1$ , each of said decidable areas being an area where decided data is assumed to

be error since each of distance of the decided data from a corresponding proper signal point is larger than a threshold value  $TH_2$ .

3. A decision feedback equalizer according to claim 2, in which  
5 said threshold values are determined so that the threshold value  $TH_1$  is equal to the threshold value  $TH_2$ : detects expansion of a signal point by noise.

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